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Subject: **Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band**  
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SES S.A. (“**SES**”) hereby submits its comments on the Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band (“**Consultation**”) issued by Innovation, Science and Economic Development Canada (“**ISED**”) on August 27, 2020.<sup>1</sup> In Part I through V of these comments, SES provides its general views with respect to the Consultation. SES’s responses to specific questions are provided in Part VI of these comments. In addition, SES is submitting a separate **Confidential Exhibit** in which confidential information in response to Q26, and confidential material redacted from this public filing, can be found.

**About SES**

SES is a global provider of satellite and connectivity solutions headquartered in Luxembourg with operations around the world. SES provides services to broadcasters, governments, telecommunications companies, and enterprises in all parts of the world. Through its subsidiaries, SES operates a fleet of over 50 geostationary (“**GEO**”) satellites in multiple frequency bands, including in the 3700-4200 MHz band with coverage of Canada. SES is the operator of the innovative O3b constellation of 20 high-throughput, low-latency satellites in Medium Earth Orbit (“**MEO**”). In 2021, SES will be launching its next generation of MEO satellites called mPOWER, which will provide even higher throughput and more flexibility. Together, SES’s satellites cover 99% of the world’s population. SES is also the parent company of Ciel Satellite L.P., which has been operating the Canadian-authorized Ciel-2 satellite in the Ku-band Broadcasting Satellite Service frequencies at 129° W since 2009.

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<sup>1</sup> Innovation, Science and Economic Development Canada, SPLB-002-20, *Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band* (Aug. 2020) (“Consultation”), available at [https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/SLPB-002-20-2020-08EN.pdf/\\$file/SLPB-002-20-2020-08EN.pdf](https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/SLPB-002-20-2020-08EN.pdf/$file/SLPB-002-20-2020-08EN.pdf).



## I. SES's Satellite Services in Canada in the 3700-4200 MHz Band

SES subsidiaries have been authorized for many years to provide Fixed Satellite Service (“FSS”) in Canada in the 3700-4200 MHz band (also referred to as the “C-band”) from satellites at multiple orbital locations, including 20° W, 22° W, 37.5° W, 40.5° W, 47.5° W, 85° W, 87° W, 103° W, 104.95° W, 131° W, and 177° W. Satellites at four of those orbital locations are also authorized to provide FSS in Canada in the 3625-3700 MHz band.

For decades, SES has been using the 3700-4200 MHz band on its satellites to provide competitive FSS in Canada to a wide range of users, both within and outside of Canada. Such services include: (1) the collection and distribution of U.S. and other international news, live events, and programming content to Canadian cable and IPTV providers serving over 10 million households, (2) broadband connectivity to indigenous communities in the North; (3) distribution of Canadian TV content abroad; (4) maritime services in the Canadian Exclusive Economic Zone including connectivity to oil rigs; and (5) connectivity for NAV Canada. Together, Canadian FSS users access more than [REDACTED]<sup>2</sup> GHz of SES satellite capacity in the 3700-4200 MHz band.

## II. The Impact of ISED's Proposal on FSS in the 3700-4200 MHz Band

In the Consultation, ISED is proposing to re-allocate the 3700-4000 MHz band (“3800 MHz band”) for mobile service and other flexible uses by 2023. Specifically, this re-allocation is intended to accommodate the “mid-band” spectrum requirements of new 5G mobile technologies, and to align the spectrum allocation in Canada with the decision of the United States to allocate the same frequency range for 5G.

ISED's proposal to re-allocate the 3700-4000 MHz band for 5G mobile service in this time period, and to remove the primary allocation for the FSS in that band (at least in non-satellite-dependent areas), will have significant ramifications for FSS operators, such as SES, and FSS end users in Canada.

First, FSS operators will no longer be able to use 60% of the bandwidth available on their C-band satellites to serve a large portion of the Canadian population. As a result, it will be very challenging and costly to maintain continuity of service to existing FSS users of the 3700-4200 MHz in Canada. SES's guiding principle is to protect all of its customers that are using SES satellite capacity in this band in Canada. All users will have to be re-packed into the remaining 4000-4200 MHz of spectrum available for FSS, or migrated to satellite systems in higher frequency bands, to be determined on a case-by-case basis. Due to the C-band's unique propagation characteristics, however, it will not be possible to move all existing users of the 3700-4000 MHz band to other bands while maintaining current service quality. SES expects that, as a default, many existing services will have to be repacked into 4000-4200 MHz rather than migrated to other bands.

The impacts on FSS operators and users are particularly acute in the case of an accelerated clearing by 2023, as proposed by ISED. While ISED's 2023 timeframe purports to follow the U.S. timeframe for clearing this band, it should be recognized that 2023 is an *accelerated* timeframe that was made

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<sup>2</sup> See Confidential Exhibit.

possible only because of the financial compensation offered by the U.S. Federal Communications Commission (“**FCC**”). The FCC assumed clearing would take 70 months (at least) from Order to clearing, but created an option for accelerating the process to 21 and 45 months for partial and full relocation, respectively, by offering financial compensation for satellite operators that choose and have the ability to accelerate clearing.<sup>3</sup>

Indeed, the FCC has recognized that clearing FSS from the 3700-4000 MHz band in the U.S. on such an accelerated timeframe would not be feasible without financial compensation for the FSS operators – both foreign and domestic – to organize and complete the clearance in time. Without such incentives, the timeframe for clearing the 3700-4000 MHz band throughout the United States would be 2025 at the earliest, eight years after the FCC initiated its process in 2017.<sup>4</sup> In contrast, ISED is only consulting on the Canadian reallocation process now, three years after the FCC initiated its process.

### III. Compensation for Accelerated Band Clearing

Accordingly, SES would urge ISED to consider offering financial compensation, similar to the compensation offered by the FCC in the U.S. to all FSS operators commercially using C-Band, for the clearing of the 3700-4000 MHz band in Canada. Such compensation would need to include reimbursement of clearance costs, as well as additional incentives for accelerated and timely completion of such clearance. Such compensation will be essential if ISED wishes to complete an orderly clearance by 2023 in support of the deployment of 5G, and to remain aligned with the U.S. timeframes for the reallocation of this band.

#### **a. Providing financial compensation for accelerated clearing would be fair and reasonable in view of the enormous benefits for Canada**

The timely introduction of 5G wireless technologies in the 3700-4000 MHz band promises significant social and economic benefits for Canadians and allows Canada to maintain its 5G leadership. According to Accenture and the Canadian Wireless Telecommunications Association, the adoption of 5G in Canada would create “a wide range of economic benefits” in sectors as diverse as transportation, healthcare, agriculture, energy, water/waste management, municipal services, public safety and rural connectivity.<sup>5</sup> Several studies have found that 5G adoption will have substantial

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<sup>3</sup> Federal Communications Commission, FCC 20-22, *In the Matter of Expanding Flexible Use in the 3.7 to 4.2 GHz Band*, Report and Order and Order of Proposed Modification, at ¶¶ 112 (Mar. 3, 2020) (“*Expanding Flexible Use Order*”) (“we set a deadline for clearing the band by 2025 while offering incumbent space station operators the option to accelerate that process to 2021 for the lower 120 megahertz and 2023 for the upper 180 megahertz.”), available at <https://docs.fcc.gov/public/attachments/FCC-20-22A1.pdf>.

<sup>4</sup> *Id.* In SES’s view, clearing the 3700-4000 MHz would require more than 70 months in the absence of financial compensation.

<sup>5</sup> Accenture Strategy (in collaboration with the Canadian Wireless Telecommunications Association), *Accelerating 5G in Canada: Benefits for Cities and Rural Communities* (2019), at 4 (“*Accelerating 5G*”), available at <https://www.cwta.ca/wp-content/uploads/2019/11/Accelerating-5G-in-Canada-V11-Web.pdf>.

impacts on the Canadian economy. For example, Accenture estimated “nearly \$40 billion annual GDP uplift by 2026” and the creation of 250,000 jobs between 2020 and 2026.<sup>6</sup>

There is also substantial evidence demonstrating that speed of new wireless deployment and the ability to outpace other countries affects economic development. Large contiguous blocks of mid-band spectrum are widely recognized as being at the core of successful 5G deployments. For example a comparison of U.S. and Korean 5G penetration rates illustrates the dramatic correlation between mid-band spectrum availability and 5G penetration. Both the U.S. and South Korea launched 5G mobile networks simultaneously in April 2019. South Korea, however, allocated 280 MHz of mid-band spectrum to mobile wireless providers in June 2018, whereas the US allocated 70 MHz of mid-band spectrum to mobile wireless providers two years later, in July 2020. More than a year later, the 5G penetration rate in South Korea reached 11.3% (as of July 2020), whereas the U.S. 5G penetration rate reached only 0.6% (as of June 2020).

While the 3700-4000 MHz band will not be the only band used for 5G, the larger bandwidths made possible by the clearing of this band, with significantly better propagation than the millimetre wave bands, makes this “mid-band” spectrum critical<sup>78</sup>

Moreover, such benefits are expected to very significantly exceed the costs of displacing existing services. Indeed, clearing this frequency range in Canada does not come as a U.S. clearing by-product, will not be costless and will not be achieved by a simple change in frequencies for customers. In addition to precluding the use of a significant part of FSS operators’ satellite investments in Canada, such clearing will require from all incumbent operators to incur additional effort and cost over and above what would be required for the clearance of the band in the U.S. The re-packing of existing C-band FSS in Canada to the 4000-4200 MHz range will require the installation of filters on thousands of Canadian earth stations operating in this range, and potentially the re-pointing of antennas if existing services are migrated to different – and potentially new – satellites. Migration of existing C-band FSS to satellite systems in other frequency bands would require even more complex equipment changes.

It is therefore fair and reasonable for FSS operators to receive financial compensation for the work of clearing the band and to ensure that the clearing is completed on the timeframe outlined by ISED.

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<sup>6</sup> See Accenture Strategy, *Fuel for Innovation: Canada’s Path in the Race to 5G*, at 2 nn.5 & 6 (2018) (“*Fuel for Innovation*”), available at <https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact-Updates-06-19-2018.pdf>; *Accelerating 5G* at 3.

<sup>8</sup> See Consultation at 7; *Fuel for Innovation* at 15 (“With the first global 5G standards having been specified, consensus is forming over what spectrum bands will be most important for early 5G deployment. These bands broadly consist of mid-band spectrum around 3500 MHz and high-band, or mm-wave, spectrum ...”); *Expanding Flexible Use Order* at ¶ 5 (“Mid-band spectrum thus presents wireless providers with the opportunity to deploy base stations using smaller cells to achieve higher spectrum reuse than the lower frequency bands while still providing indoor coverage. In addition, mid-band spectrum offers more favorable propagation characteristics relative to higher bands for fixed wireless broadband services in less densely populated areas. Given these characteristics, we expect mid-band spectrum to play a prime role in next-generation wireless services, including 5G.”).

What is more, remaining aligned with the U.S. and achieving the accelerated clearing timelines will enable Canada to realize the benefits of 5G and other flexible uses in this band years earlier than would otherwise be achievable. As noted above, such compensation is essential for an accelerated clearing by 2023, and without such incentives this timeframe for clearing would be infeasible.

Thus, SES would urge ISED to look to the example of the FCC, which offered financial compensation to enable both domestic and foreign satellite operators (including Canada's Telesat) to clear the 3700-4000 MHz band by 2023.<sup>9</sup> As the FCC found: "Given the significant public interest benefits of clearing terrestrial, mid-band spectrum more quickly, which would bring next-generation services like 5G to the American public years earlier and help assure American leadership in the 5G ecosystem, we find that requiring overlay licensees to make accelerated relocations is in the public interest."<sup>10</sup> This logic applies equally in Canada.

Providing financial compensation to incentivize FSS operators could also lead to additional benefits for Canada. The payment of such compensation will enable FSS operators to invest in new satellite capacity in the remaining C-band or in higher frequency bands in order to expand competitive satellite services throughout Canada. For example, the receipt of financial compensation would enable SES to free up the internal resources to support the business case for adding inclined MEO satellites to its existing O3b and next-generation O3b mPower constellations. This will, in turn, enable SES to provide a competitive, high-throughput, low-latency satellite service throughout all of Canada. Moreover, SES is willing to commit to procure a significant portion of the components for its inclined satellites from Canadian manufacturers, thus ensuring that the financial compensation will benefit Canadian industry and promote high-skill employment in Canada.

***b. Providing financial compensation to all FSS operators to incentivize accelerated clearance would also be consistent with Canada's international commitments***

Under a number of international trade agreements, Canada has committed to accord "national treatment" to services and service suppliers of other countries, *i.e.*, treatment that is no less favourable than that it accords, in like circumstances, to its own services and service suppliers.<sup>11</sup> It has also committed not to directly or indirectly expropriate the investments of investors from the United States and European Union (among others) without adequate compensation.<sup>12</sup> Such expropriation may occur without a formal taking of title when government action interferes with distinct, reasonable investment-backed expectations.<sup>13</sup>

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<sup>9</sup> See *Expanding Flexible Use Order* at ¶ 232 (allocating accelerated relocation payments among both domestic and foreign satellite operators). Indeed, Canada's Telesat is slated to receive US\$344.4 million in acceleration incentives on top of clearing costs upon successful completion of clearing.

<sup>10</sup> *Expanding Flexible Use Order* at ¶ 185.

<sup>11</sup> See, e.g., Canada-US-Mexico Agreement ("CUSMA"), Art. 15.3; Comprehensive Economic and Trade Agreement between Canada and the European Union ("CETA"), Art. 9.3; WTO General Agreement on Trade in Services ("GATS"), Art. XVII.

<sup>12</sup> See, e.g., CUSMA Art. 14.8; CETA Art. 8.12(1).

<sup>13</sup> See, e.g., CUSMA Annex 14-B; CETA Annex 8-A.

ISED should take these international commitments into account when establishing the legal, technical and policy framework for re-allocating the 3700-4000 MHz band for flexible use services. SES has invested hundreds of millions of dollars in long-lived C-band satellite assets to provide valuable services in Canada, and a decision to reallocate the 3700-4000 MHz band would render up to 60% of the capacity on such satellites unusable to serve most of the Canadian population. Depending on the decision with regards to satellite dependent areas (see next section), the entirety of the 3700-4000 MHz band could become unusable anywhere in Canada. Providing financial compensation to all FSS operators as part of such reallocation would ensure that Canada's compliance with its international commitments cannot be questioned.

#### IV. "Satellite-Dependent Areas"

SES takes no position on whether the 3700-4000 MHz band should be cleared for 5G in "satellite-dependent areas". SES currently provides substantial satellite services to the Kativik Regional Government ("KRG") using the 3700-4000 MHz band in areas that could be considered "satellite-dependent" by ISED.<sup>14</sup>

It is unclear whether the KRG, and the Indigenous communities it represents, wish to continue using this band for FSS for the foreseeable future. They may prefer to have the option and opportunity to deploy new 5G services in this band on the same schedule as the rest of Canada to avoid worsening the digital divide between the North and South of Canada. SES will support its customer's preferences in this regard, even though a requirement to clear "satellite-dependent areas" would add complexity and cost to the overall clearance process. It is certainly conceivable that new 5G technologies could be deployed in at least some populated areas in the North, including in some or all of Kativik's 14 towns with the support of satellite backhaul solutions.<sup>15</sup> If the KRG decides to deploy 5G in these communities, the satellite services that SES provides will have to be condensed in the upper 200 MHz band, just like the non-satellite-dependent areas of Canada.

#### V. Telesat Proposal

SES opposes the proposal of Telesat included as annex H to the Consultation ("Telesat Proposal") to the extent that it proposes the clearing of FSS up to 4100 MHz. The clearing of 3700-4000 MHz is already an incredibly challenging proposition in the U.S. and in Canada. SES' guiding principle is to keep our customers un-harmed and to maintain the best grade service. Clearing up to 4100 MHz is impracticable as continuing to provide FSS in just 100 MHz is simply unsustainable in the short and long term. With 200 MHz of remaining spectrum, re-packing existing users into the remaining

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<sup>14</sup> See, e.g., <https://www.ses.com/press-release/ses-expands-government-services-portfolio-canada> (2016).

<sup>15</sup> See, e.g., K. Liolis, J. Cahill, E. Higgins, M. Corici, E. Troutd and P. Sutton, *Over-the-Air Demonstration of Satellite Integration with 5G Core Network and Multi-Access Edge Computing Use Case*, 2019 IEEE 2nd 5G World Forum (5GWF), Dresden, Germany, 2019, pp. 1-5, available at <https://ieeexplore.ieee.org/document/8911717>. 5G backhaul may even be possible via C-band satellite, with the advent of C-band High Throughput Satellites and advanced modems. See, e.g., <http://www.comtechtel.com/news-releases/news-release-details/spacecom-and-comtech-telecommunications-corp-demonstrate-13>.

spectrum remains viable. With just 100 MHz of spectrum, not only does re-packing become impractical, but the business case for future satellites in the C-band (including replacement satellites) becomes extremely difficult to justify.

SES supports the Telesat Proposal to the extent that it postulates a mechanism for FSS operators to receive financial compensation to accelerate the transitioning of existing FSS users in the 3700-4000 MHz band to the 4000-4200 MHz portion of the band and/or to satellite systems in other frequency bands. However, SES is concerned that the Telesat Proposal is largely silent and unclear as to how its proposed secondary market transaction mechanism would work, especially with respect to the division of proceeds among affected FSS operators other than Telesat. The Telesat Proposal is also unclear on the terms on which mobile carriers would get access to the cleared spectrum.

Given these uncertainties, SES prefers a financial compensation mechanism similar to the one adopted by the FCC. Under that mechanism, both U.S. and non-U.S. FSS operators (including Telesat) will receive compensation from flexible use licensees based in part on their respective shares of the U.S. market. SES believes that the method proposed by the FCC affords greater certainty and fairness for all affected FSS operators, and possibly for the mobile carriers as well.

However, if ISED were inclined to adopt the approach suggested by Telesat, the proposal would need to be modified at a minimum so that the flexible use licence(s) is/are issued to a consortium of satellite operators (as discussed above), rather than to Telesat alone. A proper accelerated clearing of the 3700-4000 MHz band requires the concerted effort of multiple FSS operators, each orchestrating the move with their own customers, and cannot be left to Telesat alone.

In addition, in the absence of agreement among the consortium members, ISED may also need to direct how the proceeds from the secondary market transaction involving the spectrum would need to be divided among them. In SES's view, any mechanism for financial compensation must be fair between Canadian and non-Canadian satellite operators providing competing FSS in Canada in this band. Canada's commitments under its international agreements require nothing less.

## **VI. Responses to Specific Questions**

In this Part VI, SES provides its responses to specific questions raised in the Consultation.

**Q1** *ISED is seeking comments on the timelines for the development of an equipment ecosystem using 5G technologies in the 3800 MHz band. In particular:*

*a) the ecosystem maturity level and readiness of equipment under band classes n77 or n78 for the Canadian market*

*b) the ability of existing or future base station radios to handle multiple technologies and band classes at the same time (i.e. whether all four band classes (B42, B43, n77 and n78) or a subset of these band classes are able to operate on the same base station radio) and how it may affect the adoption of 5G technologies in the 3800 MHz band*

**SES Response:** No comment.

**Q2** ISED is seeking comments on the potential linkages between the equipment ecosystems using 5G technologies in the 3500 MHz and 3800 MHz bands. In particular:

a) whether contiguity between the 3500 MHz band and 3800 MHz band is preferred given that 3GPP specifications allows for non-contiguous carrier aggregation

b) whether there are any technical or operational impediments (e.g. equipment limitations/challenges to support aggregated use of spectrum, or requirements for additional base station radios) that would be incurred if operators have a large frequency separation between frequency blocks in one or both bands, and at what point (i.e. how wide the frequency separation) such impediments would become significant

c) whether the equipment ecosystem deployed for the 3500 MHz band will be able to operate in the 3800 MHz band, and whether this equipment could easily be extended to 3800 MHz after being deployed

**SES Response:** No comment.

**Q3** ISED is seeking comments on how the difference in technical rules between the U.S. and EU could impact Canada's ability to leverage the economies of scale from the global 3800 MHz ecosystem. In particular:

a) would the difference in technical rules (such as out-of-band-emission (OOBE) power limits) result in two distinct region-specific equipment ecosystems

b) which equipment ecosystem would be more suitable in the Canadian environment (noting that Canada has, for the most part, aligned with the U.S. on low - and high-band spectrum for 5G but in the mid-band, Canada is more aligned with the EU in the 3500 MHz band (3450-3650 MHz)) and specifically, whether Canada should generally align its technical rules with the U.S. or the EU in the 3800 MHz band

**SES Response:** No comment.

**Q4** ISED is seeking comments on the proposal to add a primary mobile service, except aeronautical mobile, allocation in the 3700-4000 MHz band to the CTF and the specific changes shown in annex B.

**SES Response:** Given that ISED's proposal is to introduce flexible use, including mobile, services in only the 3700-4000 MHz band, then a primary mobile service (except aeronautical mobile) allocation should be added only in that band segment. This aligns with the FCC's approach to the introduction of flexible use services in the same band segment.<sup>16</sup>

**Q5** ISED is seeking comments on developing a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band.

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<sup>16</sup> See *Expanding Flexible Use Order* at ¶ 54.



**SES Response:** SES takes no view on the licensing model for flexible use services in Canada (e.g. block sizes, geographic areas, etc.), other than to urge Canada to adopt operational constraints and coordination procedures that will protect any co-frequency (3700-4000 MHz) and adjacent band (4000-4200 MHz) FSS operations in Canada. General alignment with the United States is recommended to the extent that such alignment would facilitate cross-border coordination.

**Q6** *Given the proposal in section 7.2 on developing a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band, ISED is seeking comments on the proposal that no new FSS earth stations be authorized in the 3700-4000 MHz band in the future and that the authorization of new FSS earth station licences be limited to the 4000-4200 MHz band.*

**SES Response:** Outside of “satellite-dependent areas” (which are discussed separately below), the proposed introduction of flexible use services, including ubiquitous 5G mobile services, in the 3700-4000 MHz band necessarily precludes the licensing of new FSS earth station sites in the same band. Existing FSS services being received in this band in these areas will also need to be migrated either to the 4000-4200 MHz band or to satellite systems operating in other frequency bands, except at certain “grandfathered” gateway locations which will need to retain access to the entire 500 MHz to enable satellite TT&C and to provide feederlinks for FSS in satellite-dependent areas (see response to Q30 below).

SES would request, however, that ISED allow some operational flexibility for FSS operators to license additional FSS earth stations at the grandfathered gateway locations, provided that they claim no more interference protection from flexible use services than the grandfathered earth stations. SES would also support ISED’s proposal to allow future FSS earth stations to be deployed on a licence-exempt, no-protection basis in the 3700-4000 MHz band in all areas (see response to Q28(d) below).

**Q7** *ISED is seeking comments on the proposal to implement a 20 MHz guard band between 3980-4000 MHz to protect FSS operations in 4000-4200 MHz band from proposed flexible use operations in the 3700-3980 MHz band.*

**SES Response:** A guard band alone cannot be considered in isolation as a means of protecting FSS operations in 4000-4200 MHz from flexible use operations in the adjacent band. To protect FSS operations in 4000-4200 MHz band from proposed flexible use operations in the 3700-3980 MHz band, the FCC implemented:

- (a) a 20-MHz exclusive guard band at 3980-4000 MHz;<sup>17</sup>
- (b) a PFD limit of -124 dBW/m<sup>2</sup>/MHz applicable to flexible use unwanted emissions falling within the 4000-4200 MHz band as measured at the FSS receiver;<sup>18</sup>

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<sup>17</sup> *Expanding Flexible Use Order* at ¶ 58.

<sup>18</sup> *Id.* at ¶ 360.

- (c) a PFD limit of -16 dBW/m<sup>2</sup>/MHz applicable to flexible use emissions in the entire 3700-3980 MHz band as measured at the FSS receiver to prevent FSS receiver blocking;<sup>19</sup> and
- (d) the implementation of passband filters at satellite earth stations that will reject signals outside of the 4000-4200 MHz FSS band in order to claim interference protection.<sup>20</sup>

Importantly, such measures were implemented based on certain maximum base station and mobile terminal power limits adopted by the FCC, and after a thorough and rigorous analysis of FSS interference protection requirements and FSS receiver and filter performance.

Accordingly, SES supports ISED's proposed adoption of the FCC's 20-MHz guard band at 3980-4000 MHz, provided ISED also adopts the other measures and technical parameters adopted by the FCC for flexible use operations. Obviously, if ISED were to allow higher in-band power, or more permissive out-of-band emissions, then the size of the guard band and other parameters would need to be revisited.

**Q8** *ISED is seeking comments on the proposal to maintain a primary allocation to FSS in the entire 3700-4200 MHz band and the proposal that existing FSS earth stations in satellite-dependent areas remain licensed in the entire 3700-4200 MHz band.*

**SES Response:** In view of continuing demand for C-band satellite services, SES supports maintaining the primary allocation for FSS in the 4000-4200 MHz band throughout all of Canada. Also, if ISED grandfathers certain gateway locations in the entire 3700-4200 MHz band as suggested in Question 30 below and/or in satellite-dependent areas, it makes sense to maintain the allocation to FSS in the entire C-band. That allocation could include a new footnote to restrict FSS deployments in the 3700-4000 MHz band.

With respect to the 3700-4000 MHz band in satellite-dependent areas (see Part IV above), SES currently provides substantial satellite services to the KRG using the 3700-4000 MHz band (and above) in "satellite-dependent areas" in northern Quebec.<sup>21</sup> Continuing (and expanding) such services on a protected basis would require maintaining a primary FSS allocation in that band. However, it is unclear whether KRG, and the indigenous communities it represents, prefer to continue using the 3700-4000 MHz band for FSS for the foreseeable future or whether they would prefer to have the opportunity to deploy new 5G services in this band on the same schedule as the rest of Canada.

SES will support its customer's preferences in this regard, even though a requirement to clear the 3700-4000 MHz band "satellite-dependent areas" would add complexity and cost to the overall

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<sup>19</sup> *Id.*

<sup>20</sup> *Id.* at ¶ 371 ("In the event of a claim of harmful interference, the earth station operator must demonstrate that they have installed a filter that complies with the mask described above. If they have not installed such a filter or are unable to make such a demonstration, and the 3.7 GHz Service licensee can confirm it meets the blocking PFD, the earth station operator will have to accept the interference.").

<sup>21</sup> See, e.g., <https://www.ses.com/press-release/ses-expands-government-services-portfolio-canada> (2016).

clearance process. It is certainly conceivable that new 5G technologies could be deployed in at least some populated areas in the North, with the support of satellite backhaul solutions.<sup>22</sup>

If the 3700-4000 MHz band is preserved for FSS use in “satellite-dependent areas,” it is unclear why it would be preserved only for existing deployments and not for future ones. Such an approach may result in the 3700-4000 MHz band being unused for flexible use and unusable by the FSS industry in large parts of Canada. If satellite-dependent areas are to have access to the entire 500 MHz in C-band, then there should be no restrictions on future earth station deployments in such areas.

**Q9** *ISED is seeking comments on the future demand for C-band in rural and remote areas such as the North, including the following:*

*a) the trend towards using higher frequencies by FSS operations to provide broadband connectivity*

*b) the ability of using higher frequencies to replace current C-band capacity and the potential timelines*

*c) the possibility of a trend towards using 4000-4200 MHz in combination with other connectivity options (e.g. higher frequencies satellites or wireline solutions) and when it would be expected to be available for satellite-dependent areas*

**SES Response:** SES believes that future demand for broadband connectivity in rural and remote areas such as the North will continue to grow at comparable rates as the rest of Canada. For example, the CRTC reports that the average data usage per month by Canadian residential broadband subscribers increased by 25.9% between 2017 and 2018.<sup>23</sup> Moreover, since SES signed KRG as a customer (see response to Q8 above), **[REDACTED]**.<sup>24</sup>

Today, C-band satellite services are among others used to provide broadband connectivity in rural and remote areas, including to SES’s customer KRG in northern Quebec. In most instances, C-band satellites provide the trunking and backhaul that connect these remote communities to the South, rather than direct connections to individual households. The latter, referred to as the “last mile”, can be achieved through a variety of wireline or wireless means. SES expects that, with enough spectrum, C-band satellites will remain a viable and essential connectivity option in the North and other rural and remote parts of Canada to the point where it can be used to support 5G mobile networks (see response to Q8 above).

(a) While satellite services in higher frequency bands offers some advantages in terms of smaller and less expensive terminal equipment, such services will likely never be a complete replacement for C-band satellite services, especially those that require high availability as illustrated by outages experienced by Communities having switched from C- to Ka-band.<sup>25</sup> Satellite services in the C-band frequencies are highly resistant to atmospheric attenuation as a result of rain or other precipitation.

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<sup>22</sup> See, *supra* note 15.

<sup>23</sup> CRTC, *Communications Monitoring Report 2019*, at 255 (2019), available at <https://crtc.gc.ca/eng/publications/reports/policymonitoring/2019/index.htm>.

<sup>24</sup> See Confidential Exhibit.

<sup>25</sup> <https://www.cbc.ca/news/canada/north/nunavut-data-rain-tamarmik-nunaliit-1.5592645>



While some loss of availability or throughput as a result of rain might be acceptable for some consumer broadband services, higher levels of availability are demanded by governments, telecommunications carriers, and broadcast and enterprise customers.

(b) In terms of current supply, several conventional, wide-beam Ku-band satellites are in place today that can serve the North and rural and remote areas of Canada. In addition, SES's SES-15 High Throughput Satellite ("HTS") has 12 Ku-band spot beams covering nearly all of Canada that could be used to support broadband services throughout nearly all of Canada.<sup>26</sup> Telesat's Anik F2 would also appear to have Ka-band spot beam coverage of the North, as does Telstar 19 Vantage in the eastern half of Canada.<sup>27</sup> SES's O3b system, and its soon-to-be-launched mPower extension, operate in equatorial Medium Earth Orbit, and so cannot currently serve the higher latitudes (above 55 degrees) in Canada. SES has plans to augment its equatorial MEO constellation with inclined satellites that will be able to serve the higher latitudes. Nascent LEO constellations, such as OneWeb and SpaceX's StarLink, are still in their launch phases and so are not yet able to provide continuous commercial services in Canada. Amazon's Kuiper and Telesat's LEO constellations are not expected to be in commercial operation for a few years still.

(c) As noted above, satellite services today (predominantly in the C-band) are already being combined with other connectivity options to provide broadband services in the North and rural and remote areas of Canada. For example, it is not uncommon for terrestrial fixed line, 3G/4G mobile, fixed microwave, and/or Wi-Fi networks to be connected via C-band satellite back to the more populated areas of Canada and the Internet backbone. SES foresees a path and role for multi-band satellite services to backhaul new 5G services in rural and remote areas of Canada, including the North.

Of course, this is only viable if there are no frequency conflicts between the terrestrial and satellite services and if there is enough satellite spectrum allocated to support the terrestrial requirements. In SES's view, retaining 4000-4200 MHz band for satellite in the North and in rural and remote areas of Canada preserves the viability of the C-band as a complementary technology in such areas. Reducing the amount of spectrum remaining to 100 MHz, as proposed by Telesat, would be impractical and would likely put at risk the future use of C-band for such purposes.

**Q10** *In addition to capacity requirements, ISED is seeking comments on other issues that should be considered in maintaining broadband connectivity in satellite-dependent areas. In providing comments, respondents are requested to include supporting arguments and rationale.*

**SES Response:** In SES's view, it is not enough for ISED to simply "maintain[] broadband connectivity in satellite-dependent areas," which suggests maintaining existing levels of broadband availability and connectivity in such areas. As the CRTC reports, the North and rural and remote areas of Canada continue to experience a significant gap in the availability of higher broadband speeds. As a result, SES would suggest that ISED consider not just how to "maintain" existing connectivity, but also what

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<sup>26</sup> See <https://www.ses.com/our-coverage#/explore/satellite/372>.

<sup>27</sup> See <https://www.telesat.com/geo-satellites/>.

is needed to close the gap in satellite-dependent areas to ensure equitable, reliable and affordable digital access in rural and remote regions of Canada.

It is highly likely that it will not be economically feasible to connect the most sparsely populated parts of Canada using terrestrial technologies alone. Fortunately, satellites can directly connect “satellite-dependent areas” and have done so for decades. In addition, as noted above, satellite solutions have helped extend the reach of terrestrial networks (including 4G-LTE networks) into places that they would not otherwise reach. Such satellite technologies have proven to be cost-effective, since terrestrial carriers would naturally deploy fibre if it were cheaper to do so.

In this regard, ISED may want to consider SES’s proposal for financial compensation (see Part III above) to incentivize the accelerated clearing of 3700-4000 MHz in the populated parts of Canada, and into the remote areas, if they wish to deploy 5G mid-band services like the rest of the country. The incentives can be structured to ensure that at least some portion is re-invested in a satellite solution to expand rural and remote connectivity in Canada, including in the North. For example, as noted above, SES has plans to augment its existing MEO HTS constellation with inclined satellites that will be able to serve Canada’s higher latitudes. If ISED accepts SES’s proposal for financial compensation, SES would be able to advance its plan for the procurement and launch of such an inclined constellation, including procurement of a significant portion of the components for such satellites from Canadian manufacturers. This will ensure that the financial incentives offered by ISED will result in direct and measurable benefits for Canadian industry and help stimulate research and development in Canada in the field of telecommunications, while enabling the North and rural and remote areas of Canada to enjoy a competitive high-throughput low-latency satellite service in the future.

**Q11** *ISED is seeking comments on its proposal to remove the FSS allocation in the 3500-3650 MHz band and to suppress Canadian footnote C20 in the CTFA as detailed in annex B. In addition, ISED is seeking comments on the proposed grandfathering of the existing earth station operations listed in annex C, such that fixed or mobile stations in the 3500-3650 MHz band will be required to coordinate with these earth stations as specified in SRSP-520. In providing comments, respondents are requested to include supporting rationale and arguments.*

**SES Response:** SES has no strong view on ISED’s proposal to remove the FSS allocation in the 3500-3650 MHz band. While four SES satellites are currently authorized to provide service in Canada in a limited portion of the band (3625-3650 MHz), they are not currently providing services in Canada in this band segment. SES would request, however, flexibility to communicate with the grandfathered earth stations and to co-locate new FSS earth stations near the existing grandfathered earth stations, provided that such operations do not require any more interference protection than the existing grandfathered earth stations. Authorizing new FSS earth stations in this manner should not preclude any additional areas from receiving flexible use services (beyond the areas already precluded by grandfathered earth stations). The grandfathered earth stations (and any new earth stations near them, as proposed by SES above) should be recognized in the CTFA.

**Q12** ISED is seeking comments on its proposal to remove the primary FSS allocation from 3650-3700 MHz and suppress Canadian footnote C33 in the CTFA as detailed in annex B.

**SES Response:** SES has no strong view on ISED's proposal to remove the FSS allocation in the 3650-3700 MHz band. While four SES satellites are currently authorized to provide service in Canada in this band, they are not currently providing services in Canada in this band segment.

**Q13** ISED is seeking comments on:

a) establishing unpaired blocks of 10 MHz for the 3650-3700 MHz band

b) establishing unpaired blocks of 10 MHz for the 3700-3980 MHz band

In providing comments, respondents are requested to include supporting rationale and arguments.

**SES Response:** No comment.

**Q14** Subsequent to changes to the spectrum utilization described in section 7 and recognizing the need to change the current WBS licensing model, ISED is seeking comments on its proposal to displace the existing WBS licensees and designate 80 MHz of spectrum available for the development of a new shared licensing process in the 3900-3980 MHz band as described in Option 2. Specifically, ISED is seeking comments on:

a) the amount of spectrum proposed (80 MHz) under a shared spectrum licensing process

b) whether there should be a provision that allows certain users (e.g. existing WBS licensees) priority licensing (e.g. an initial application window before accepting applications from others)

Preliminary comments on a future shared spectrum licensing process are being sought in section 9.1.4 below.

**SES Response:** SES takes no view on the issues raised in this Question, except to note that if 3900-3980 MHz is to be a shared use band with both WBS and flexible use services (e.g., either or both are allowed to operate at the higher flexible use power levels), then all services in the band must abide by the technical measures necessary for the protection of FSS earth stations from the higher powered services (see, e.g., responses to Q7, Q28, Q36, Q46 and Q48).

**Q15** Given the proposal to implement Option 2, ISED is seeking information on potential costs such as upgrading equipment, which may be incurred by WISPs that are displaced from 3650-3700 MHz to provide services using the 3900-3980 MHz band.

**SES Response:** No comment, other than to note that the displacement of existing FSS users from 3700-3980 MHz to 4000-4200 MHz (or to higher frequency bands) will also entail substantial costs. In fact, every FSS earth station in Canada that will continue to operate in 4000-4200 MHz (especially those in areas near anticipated flexible use deployments in 3700-3980 MHz and/or relocated WBS sites in 3900-3980 MHz) will need to be visited so that new filters can be installed and other equipment changes made. As SES has proposed above, financial compensation is warranted to cover such costs and to provide incentives for FSS operators to organize an orderly clearing of the band.

**Q16** Based on the proposal to implement Option 2, ISED is seeking comments on the proposed displacement deadlines, with WBS operations in urban areas being displaced by December 2023 and all others by December 2025. Respondents are invited to propose other protection and displacement options for consideration, provided they include a strong rationale.

**SES Response:** No comment.

**Q17** ISED is seeking comments on the Tier 4 service areas that would be considered urban as defined above and as listed in annex D.

**SES Response:** No comment.

**Q18** ISED is seeking comments on whether the moratorium should be extended to include all Tier 4 service areas.

**SES Response:** No comment.

**Q19** ISED is seeking preliminary comments on the future spectrum licensing process for 3900-3980 MHz, including the following:

- a) what type of applications are envisioned for this spectrum
- b) what type of shared licensing process ISED should consider (e.g. database approach, licensee to licensee coordination)
- c) what additional measures ISED should consider employing to manage access to the band in high demand areas, such as major metropolitan centres
- d) what technical restrictions should be considered (e.g. technical rules similar to adjacent 3500 MHz flexible use band with reduced power levels, a guard band between new flexible use systems below 3900 MHz, shared use above 3900 MHz, etc.)
- e) what type of eligibility criteria, if any, should be established

**SES Response:** SES takes no view on the issues raised in this Question, except to note that if 3900-3980 MHz is to be a shared use band with both WBS and flexible use services (e.g., either or both are allowed to operate at the higher flexible use power levels), then all services in the band must abide by the technical measures necessary for the protection of FSS earth stations.

**Q20** ISED is seeking comments on its proposal that existing FSS earth stations licensed in 3650-3700 MHz after June 11, 2009, be permitted to continue to operate on a no-protection basis with respect to proposed new flexible use operations.

**SES Response:** SES respectfully requests that ISED extend the present ability of FSS users to obtain future FSS earth stations in the 3650-3700 MHz on a secondary, non-protected basis relative

to proposed new flexible use operations. There is no reason to limit continued non-protected FSS operations to existing FSS earth stations licensed after June 11, 2009. By their nature, non-protected operations will not preclude the deployment of flexible use services in any area.

**Q21** *ISED is seeking comments on whether the Tier 4 service areas identified for exemption of certain provisions in GL-10 for mmWave bands as listed in annex E would be appropriate to apply for FSS operations in the 3700-4200 MHz band. ISED invites alternative proposals for areas that would be considered satellite-dependent (e.g. based on Tier 5 categories).*

**SES Response:** SES's position on FSS operations in the 3700-4200 MHz band in "satellite-dependent areas" is set out in Q8, above. As to the definition of "satellite-dependent areas," SES notes that the 3700-4000 MHz band has better propagation characteristics than the millimetre wave bands, which suggests that there should be more or larger areas that could be economically served by flexible use services in 3700-4000 MHz than in the millimetre wave bands. This would call into question whether Tier 4 service areas contained in Annex E of this consultation and identified as part of a millimetre wave consultation should automatically count as "satellite-dependent" for the purposes of the 3700-4000 MHz band.

By the same token, the better propagation at 3700-4000 MHz will make co-frequency sharing more difficult between FSS earth stations in "satellite-dependent areas" and flexible use services in non-satellite-dependent areas. For any given flexible use transmit power level, the separation distance needed to protect FSS earth stations at 3700-4000 MHz will be significantly larger than in the millimetre wave bands. SES and other satellite operators have demonstrated that distances in the order of 10 km are sufficient to protect millimetre wave Upper Microwave flexible use stations at the FCC (and ISED) protection level from transmitting FSS earth station. In C-band, the protection distance for sensitive receive earth stations, with signals originating 36000 km in space, require separation distance in the order of 100km or more. Therefore, the provisions of GL-10 are not appropriate for the C-band.

**Q22** *ISED is seeking comments on whether certain remote industry operations, for example offshore oil drilling platforms, should be included in the definition of satellite-dependent areas. In providing comments, respondents are requested to include supporting rationale and arguments.*

**SES Response:** SES supports the continued ability to use the full 3700-4200 MHz band for both existing and future services in offshore areas (e.g. on offshore oil platforms or on ships) where flexible use services are unlikely to be deployed. As SES has explained in Q8 above, it sees no rationale for preserving only existing FSS deployments in 3700-4000 MHz in "satellite-dependent areas" and not future deployments. Taking such an approach to limit the growth of new earth stations in offshore areas would also likely result in the 3700-4000 MHz band being unused for flexible use and unusable by FSS operators in such areas.

**Q23** *ISED is seeking comments on its proposal to modify the existing FSS satellite authorizations to limit FSS operations in 3700-4000 MHz in non-satellite-dependent areas of Canada to a no-*





*interference basis. ISED is also seeking comments on the proposal to adjust the conditions of licence for FSS operations to reflect the proposals as of the FSS transition deadline, including the possible removal of a high expectation of renewal for the 3700-4000 MHz portion of the band.*

**SES Response:** ISED's proposal to simply modify existing FSS satellite authorizations to (largely) preclude the use of 3700-4000 MHz in non-satellite dependent areas as of the transition date would be highly disruptive to the many FSS users of this band in Canada. SES, for example, uses this frequency range for (1) the collection and distribution of U.S. and other international news, live events, and programming content to Canadian cable and IPTV providers serving over 10 million households; (2) broadband connectivity to Indigenous communities in the North; (3) distribution of Canadian TV content abroad; (4) maritime services in the Canadian exclusive economic zone including connectivity to oil rigs; and (5) connectivity for NAV Canada. More than [REDACTED]<sup>28</sup> of SES C-band capacity is currently under contract for use in Canada.

While ISED is correct in noting that U.S. video and radio distribution services will be relocated to the 4000-4200 MHz band as part of the U.S. process for clearing the 3700-4000 MHz band, it must recognize that this is only a portion of the services used in Canada and that significant additional effort and cost will need to be incurred to ensure that the recipients of such services in Canada are also properly transitioned and can continue to receive the service. Additional effort and cost will of course be required to clear the Canada-only FSS services in this band. As noted elsewhere, every FSS earth station in Canada that will continue operating in the 4000-4200 MHz band will need to be surveyed, visited so that a new filter can be installed, among other equipment changes in synchronization with space segment re-grooming, in order to be able to continue functioning after the introduction of flexible use services in 3700-3980 MHz. Additional satellites may also be required to ensure continuity of services for all affected FSS users.

Accordingly, SES would urge ISED to seriously consider financial compensation (see Part III above) to incentivize the FSS operators to organize the orderly and rapid transition of Canadian FSS services out of the 3700-4000 MHz band. The FCC has recognized the value of an accelerated and orderly clearance, both to ensure continuity of service for existing FSS users and to accelerate the benefits of 5G and other flexible uses in the band.

Moreover, as SES has submitted above, the introduction of 5G and other flexible use services in the 3700-4000 MHz band promises to bring substantial benefits to Canada. At the same time, the proper transition of existing FSS users in Canada will involve significant additional cost and effort over and above the cost and effort required to clear the same band in the U.S. It is therefore fair and reasonable that the FSS operators receive financial compensation to incentivize them to complete the work on the timeframe outlined by ISED and to cover their costs. What is more, remaining aligned with the U.S. and achieving the accelerated clearing timelines will enable Canada to realize the benefits of 5G and other flexible uses in this band years earlier than would otherwise be achievable.

Finally, it should be recognized that ISED's proposal to modify FSS satellite authorizations would render the 3700-4000 MHz band on multiple satellites unusable to serve the vast majority of the Canadian population. Under ISED's proposal, even in satellite-dependent areas the 3700-4000 MHz

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<sup>28</sup> See Confidential Exhibit.

band on these satellites will not be usable to provide any new service that is not already currently being provided. Such a precipitous and drastic impairment of FSS operators' satellite assets (tangible property) would implicate Canada's commitments under its international trade agreements.

**Q24** *ISED is seeking comments on its proposed date of December 2023 as the Canadian FSS transition deadline.*

**SES Response:** The proposed date of December 2023 is intended to align the Canadian FSS transition deadline with that of the United States. This is a good idea in principle as it will simplify cross-border coordination with the U.S. However, it should be noted that December 2023 is the FCC's *accelerated* time frame that was proposed to satellite operators in return for financial compensation to incentivize early clearing.<sup>29</sup> The FCC assumed clearing would take 70 months (at least) from Order to clearing, but created an option for accelerating the Order-to-relocation process down to 21 and 45 months for the first tranche and the full relocation, respectively, by offering financial compensation on top of covering all relocation costs for satellite operators that choose to accelerate clearing. Without such financial compensation, the clearance of this band in a manner that preserves continuity of service for FSS users would extend well beyond December 2023 by many years.

Accordingly, SES would urge ISED to consider providing financial compensation (see Part III above) to incentivize the FSS operators for an accelerated clearance of the 3700-4000 MHz band in Canada. Only with such support can Canada ensure that its transition date for the 3700-4000 MHz will be harmonized with the United States, and that Canada will realize the full benefits of 5G at the same time as the U.S. - years earlier than would otherwise be achievable.

**Q25** *ISED is seeking comments on how the U.S. transition will impact the availability of FSS capacity in Canada.*

**SES Response:** The harmonized U.S. and Canadian reallocation of the 3700-4000 MHz for 5G and other flexible use services available will mean that FSS capacity in this band will no longer be available for new services in Canada. Even in satellite-dependent areas, no new services can be offered in the 3700-4000 MHz band since ISED is proposing to only allow *existing* FSS earth stations to continue operating in such areas.

In addition, in the remaining 4000-4200 MHz, there is likely to be increased contention since the remaining FSS capacity will need to serve both U.S. and Canadian requirements. The provision of financial compensation to FSS operators for clearing the band, as proposed by SES (see Part III above), would help redress this situation by (among other things) enabling FSS operators to invest in new satellite capacity, whether in the remaining C-band or in higher bands, to serve Canada.

**Q26** *ISED is requesting information to assist with the consequent decision following this consultation. This information includes satellite transponder migration plans, frequencies, and how*

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<sup>29</sup> *Expanding Flexible Use Order* at ¶ 155.

satellite operators serving the Canadian market will accommodate all Canadian customers, and on which frequencies. Requested information could include, but is not limited to:

- the names and number of satellites that will need to migrate to the 4000-4200 MHz band
- the number of new satellites that may be required to serve the Canadian market
- the locations of earth stations communicating with these satellites
- the number of antennas and locations of associated earth stations that will need to be returned and/or repointed
- the flexibility of existing satellites to modify operations according to the different areas of Canada

This information should be submitted on a confidential basis, as instructed in section 13.

**SES Response:** SES is still in the process of formulating satellite transponder migration plans for Canadian recipients of its satellite services in the 3700-4000 MHz band. Any transition plan, of course, will be contingent on ISED's final decision in this Consultation. Some preliminary information of the kind requested by ISED is included in a separate **Confidential Exhibit**.

SES's task is complicated by the fact that many of the video services that it delivers into Canada in this band are on behalf of U.S. video programming networks. For such services, SES's contractual relationship is with the U.S. video network originating the video programming and not with the Canadian recipients of that programming, making it difficult to identify and locate the recipients. The problem is exacerbated by the fact that many C-band receive-only earth stations are operated on a licence-exempt basis in Canada. Based on the information that is available, SES can report that it is delivering U.S. video programming to the top seven Canadian broadcasting distribution undertakings ("**BDUs**"), which together served 97% of the BDU subscribers in Canada in 2018 (approximately 10.4 million out of the 10.8 million BDU subscribers).<sup>30</sup>

In addition, SES can also publicly confirm that it is providing substantial broadband connectivity to the KRG, and the indigenous communities that KRG serves, using the SES-2 satellite at the 87° W orbital location.<sup>31</sup> Since initial contracting in 2016, **[REDACTED]**.<sup>32</sup>

For more accurate transition planning, it would be very helpful if FSS operators could obtain access to the information that ISED has collected about licence-exempt earth stations in Canada. Release of such information to each FSS operator could be on a confidential basis and limited to those earth stations authorized to communicate with that FSS operator's satellites.

**Q27** ISED is seeking comments on its proposed transition deadline of December 2023 for FSS earth stations, in which existing FSS earth station licences would be modified to 4000-4200 MHz in the relevant areas.

**SES Response:** See response to Q24 above.

<sup>30</sup> CRTC, Communications Monitoring Report 2019, at 208-209.

<sup>31</sup> See <https://www.ses.com/press-release/ses-expands-government-services-portfolio-canada> (2016).

<sup>32</sup> See Confidential Exhibit.

**Q28** ISED is seeking comments on making amendments to the relevant conditions of licence and technical rules in the 3700-4200 MHz band as well as the 3450-3700 MHz band in order to implement the following proposals with respect to protection from interference:

a) **prior to the transition deadline**, existing licensed FSS earth stations may operate in the entire 3700-4200 MHz band in all areas and be protected from interference from flexible use operations both in-band (3700-3980 MHz) and the adjacent 3450-3700 MHz band

b) **after the transition deadline**, existing licensed FSS earth stations may continue to operate in the entire 3700-4200 MHz band in satellite-dependent areas and be protected from interference from in-band flexible use operations in 3700-3980 MHz, but would not be protected from flexible use operations in the adjacent 3450-3700 MHz band; however, ISED also proposes that flexible use licensees deploying stations in the 3450-3700 MHz band within 25 km of an existing licensed FSS earth station in the 3700-4200 MHz band be required to provide a notification to these operators, one year prior to the deployment of fixed or mobile stations

c) **after the transition deadline**, FSS earth stations would only be licensed to operate in the 4000-4200 MHz band in non-satellite-dependent areas and would be protected from flexible use operations in the adjacent 3700-3980 MHz band

d) **after the transition deadline**, FSS earth stations operating in 3700-4000 MHz, in all areas, which are not eligible for licensing could continue to operate as a licence-exempt station without protection from flexible use operations both in-band and adjacent band(s)

**SES Response:** SES responds to ISED's proposals in Q28 as follows:

(a) Prior to the transition deadline, SES supports the continued operation of existing licensed FSS earth stations in the entire 3700-4200 MHz band, including maintaining interference protection from flexible use services in the 3700-3980 MHz and 3450-3700 MHz band. The measures necessary for co-channel and adjacent band protection are discussed in responses to Q36, and Q46 to Q50 below.

(b) After the transition deadline, subject to the preferences of its customers in satellite-dependent areas, SES supports the continued protection of existing licensed FSS earth stations in such areas in the 3700-4200 MHz band from in-band flexible use operations in the 3700-3980 MHz band. However, SES does not support ISED's proposal to leave licensed FSS earth stations in satellite-dependent areas unprotected from interference from flexible use services in the 3450-3700 MHz band. The proposal for such flexible use operators to simply provide a notification to the FSS earth station operator is not a remedy to prevent adjacent band interference. In SRSP-520, ISED adopted a 25 km coordination distance between flexible use stations in the band 3450-3650 MHz and FSS receive earth stations operating in the 3700-4200 MHz band – and this was considering a 50 MHz guard band between the two services. With the introduction of high-powered flexible use services right up to the band edge in 3450-3700 MHz, adjacent band protections become even more important for FSS earth stations continuing to operate in the 3700-4000 MHz band.

Rather than a 25 km coordination distance, if ISED is serious about preserving existing FSS use of the 3700-4200 MHz band in the satellite-dependent areas, it should implement appropriate measures to protect such services from flexible use emissions in the adjacent 3450-3700 MHz band (see

responses to Q46, Q47 and Q48). The fact that adjacent band measures have not been required to protect existing FSS earth stations in 3700-4200 MHz from WBS in 3650-3700 MHz is not dispositive, given the much higher power levels envisaged when flexible use services are introduced into that band. At the 4000 MHz band edge, a 20 MHz guard band at 3980-4000 MHz, together with in-band and out-of-band PFD limits and bandpass filters, were deemed necessary by the FCC to protect FSS operations in the 4000-4200 MHz band from flexible use operations in 3700-3980 MHz (see also the response to Q28(c) below). If flexible use technical parameters in 3450-3700 MHz are the same, then an equivalent 20 MHz guard band at 3680-3700 MHz and PFD limits will be needed to protect continuing FSS operations in the 3700-4200 MHz band from adjacent flexible use services in 3450-3700 MHz in addition to new bandpass filters for the FSS earth stations.

Such measures should not present a significant burden to flexible use licensees in 3450-3700 MHz, as they would only be needed when the licensee is operating (whether in a satellite-dependent area or not) near an existing licensed FSS earth station that is in a satellite-dependent area and which is still operating in the 3700-4000 MHz band. Even if, as SES submits, new FSS earth stations are allowed in this band in satellite-dependent areas, the additional burden of protecting these stations should not be too onerous, given the low population density in such areas.

(c) After the transition deadline, if ISED continues to carve out satellite-dependent areas, SES supports ISED's proposal to only license FSS earth stations in non-satellite dependent areas to operate in the 4000-4200 MHz band, and to protect them from interference from flexible use operations in 3700-3980 MHz. This could be achieved through unwanted emissions, or OOBE PFD limits, in-band limits and/or a coordination distance. The actual measures can be further evaluated in the development of a new SRSP to replace or supplement SRSP-520. Even in satellite-dependent areas, ISED is proposing to only license any future FSS earth stations to operate only in the 4000-4200 MHz range, which would be quite constraining considering the increasing demand for more bandwidth in such areas. SES assumes that existing FSS earth stations in satellite-dependent areas would also be protected from flexible use operations in 3700-3980 MHz.

(d) After the transition deadline, SES supports ISED's proposal to allow FSS earth stations in all areas not eligible for licensing to continue operating on a licence-exempt basis without interference protection from flexible use services.

**Q29** *ISED is seeking comments on the proposed change to the CTFA to add the new footnote CZZ proposed above and shown in annex B.*

**SES Response:** The new footnote CZZ proposed by ISED provides that "As of [Transition deadline], FSS earth stations in the band 3700-4000 MHz will operate on a no-protection basis, except for in satellite-dependent areas, as per [future decision paper]." In SES's view, the proposed footnote will need to be modified to recognize that certain satellite gateways in non-satellite dependent areas will also be afforded protected access to the 3700-4000 MHz band (as proposed by ISED in Question 30).

**Q30** ISED is seeking comments on how to ensure the continued operation of gateways that support the provision of services in satellite-dependent areas, specifically:

- a) how much spectrum would be required at these gateway sites
- b) if these stations could be consolidated into two sites, away from major population centres, and where the best locations for those sites would be

**SES Response:** ISED has correctly identified that, in order to continue existing satellite services in satellite-dependent areas using the 3700-4000 MHz band, a certain number of satellite gateways in non-satellite-dependent areas will also need to be able to operate in the 3700-4000 MHz band on a protected basis. Such gateways are “often located near fibre and other infrastructure outside of satellite-dependent areas and are essential to the provision of service ...”<sup>33</sup>

In addition to satellite gateways needed to serve satellite-dependent areas, ISED should also consider affording protected access to existing satellite gateway locations that are used for Telemetry, Tracking and Command (“**TT&C**”) of FSS satellites using the 3700-4000 MHz band. Such sites are also typically located near good fibre and other terrestrial infrastructure, and typically cannot be practically relocated to a satellite-dependent area, nor can TT&C frequencies be changed on existing C-band satellites.

(a) If existing satellite services in 3700-4000 MHz is to be maintained in satellite-dependent areas, the amount of spectrum that would be required at the gateway sites in non-satellite-dependent areas will depend on how much is being used to provide the services today. If, as ISED proposes, only existing FSS services in satellite-dependent areas will be allowed to continue using the 3700-4000 MHz band, then only the corresponding spectrum (return links from the satellite-dependent areas) at the gateway will need to be preserved. However, as SES has submitted, if the 3700-4000 MHz band is to be preserved for service in satellite-dependent areas, it is less than clear why new or expanded services in the 3700-4000 MHz band in such areas should not be allowed. ISED may want to reconsider this limitation and allow additional services in the 3700-4000 MHz band in satellite-dependent areas to meet growing demand, even though this would increase the spectrum requirements at the satellite gateways.

(b) It is unclear if it would be practical to consolidate all existing satellite gateways currently supporting satellite-dependent areas in the 3700-4200 MHz band. In some cases, the FSS operators provide these gateway services, typically at a small number of locations. However, in other cases, the satellite gateway is operated by the FSS operator’s customer or by a third party, and it may not be so easy to consolidate all of these private gateways. Different customers may also be on different or multiple satellites, and thus require a separate gateway antenna pointed at each satellite. The ability to consolidate down to a small number of gateway locations may thus depend on whether multiple antennas pointed at different satellites can be co-located at these locations. Given these variables, SES would recommend that ISED solicit additional information from the FSS operators and their customers before reaching a conclusion on whether only two such gateway locations will be sufficient and where they should be located.

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<sup>33</sup> Consultation at ¶ 138.

**Q31** *ISED is seeking comments on its proposal to issue interim authorizations for certain existing licence-exempt earth stations in the 3700-4200 MHz band.*

**SES Response:** Subject to its response to Q36 below, SES generally supports ISED's proposal to provide a mechanism for certain licensed-exempt earth stations (namely, those that are part of an enterprise network and not individual DTH receivers) to be conveniently licensed under an "interim authorization" model. In essence, ISED is proposing to modify its existing procedure in the Ku-band and Ka-band for the convenient licensing of multiple "Typical Earth Stations" under a single license to apply to certain earth stations currently operating on a licence-exempt basis in the 3700-4200 MHz band. The principal difference between the new procedure in the C-band and the existing procedures in the Ku- and Ka-bands is the requirement to provide individual site information in order to facilitate the transition and future coordination.

**Q32** *ISED is seeking comments on the proposed deadline of up to 90 days after the publication of a decision for submitting applications for these interim authorizations of existing licence-exempt FSS earth stations in the 3700-4200 MHz band.*

**SES Response:** In SES's view, 90 days is the minimum amount of time necessary to provide a fair opportunity for eligible licence-exempt earth stations to be licensed through the proposed interim authorization mechanism. It may take time for BDUs and other enterprises operating licence-exempt earth stations to gather all of the location-specific information required to apply for an such authorization, especially for those who have operated many such earth stations for a long period of time without any need to obtain or maintain such information. ISED should be guided by the responses it received from its Request for Information on Fixed Satellite Service (FSS) Earth Stations Operating in the 3700-4200 MHz Band (SAB-001-19). The deadline for such submissions was originally November 1, 2019 and this was recently extended per this Consultation to November 30, 2020. The number of such stations communicated to ISED would be an indicator for timing.

**Q33** *ISED is seeking comments on its proposal that receive-only earth stations that are not eligible for an interim authorization or whose operators do not seek authorization, could continue to operate as a licence-exempt earth station on a no-protection basis.*

**SES Response:** SES supports ISED's proposal in Q33.

**Q34** *ISED is seeking comments on its proposal that in non-satellite-dependent areas, existing earth stations that operate under interim authorizations receive in-band protection from flexible use operations in the 3700-3980 MHz band until the transition deadline.*

**SES Response:** SES supports ISED's proposal in Q34, but would request that such earth stations also receive adjacent band protection from flexible use operations below 3700 MHz until the transition deadline (see responses to Q28 and Q31 above).

**Q35** ISED is seeking comments on its proposal that in satellite-dependent areas, existing earth stations that operate under an interim authorization receive in-band protection from flexible use operations in the 3700-3980 MHz band before and after the transition deadline.

**SES Response:** SES supports ISED's proposal in Q35, but would request that such earth stations also receive adjacent band protection from flexible use operations below 3700 MHz both before and after the transition deadline (see response to Q28 above). In addition, if ISED continues to allow 3700-4000 MHz to be used to serve satellite-dependent areas, SES would request that ISED allow licensing of future earth stations in this band to meet growing demand and to provide such earth stations with the same protection. If this measure is not implemented, the satellite-dependent area exception permitting FSS services to continue will be a *band-aid* solution.

**Q36** ISED is seeking comments on its proposal that in all areas, existing licence-exempt earth stations that operate under an interim authorization receive no protection from adjacent band WBS stations and flexible use stations operating below 3700 MHz before and after the transition deadline.

**SES Response:** SES does not support ISED's proposal not to provide existing licence-exempt earth stations that operate under an interim authorization with any protection from adjacent band WBS stations and flexible use stations operating below 3700 MHz.

With respect to low-powered WBS, the lack of adjacent band protection for FSS may be acceptable, given the lack of any significant interference incidents to date. However, ISED is proposing to move WBS to the 3900-3980 MHz band and to introduce flexible use services into both the 3450-3650 MHz and 3650-3700 MHz bands. Such flexible use services will be operating at much higher power than existing WBS systems, and thus pose a much higher risk of adjacent band interference and receiver blocking to existing FSS earth stations operating in the 3700-4000 MHz band.

Given the acknowledged importance to broadcasting of licence-exempt earth stations in this band,<sup>34</sup> SES would recommend that appropriate adjacent band measures be put in place to protect such FSS earth stations prior to the transition deadline. Such measures are needed to prevent service disruptions during the transition period, and should be modelled on the measures adopted by the FCC for the protection of FSS in the 4000-4200 MHz band from flexible use in 3700-3980 MHz band.

At a minimum, flexible use services operating below 3700 MHz should:

- Maintain a minimum 20 MHz frequency separation from FSS operations above 3700 MHz. If, before the transition deadline, 3650-3700 MHz is a low-power WBS-only band, then this frequency separation will naturally be met for flexible use operations below 3650 MHz. But, if ISED introduces flexible use services before the transition deadline, a new 20 MHz guard band at 3680-3700 MHz will have to be established for the duration of the transition period.

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<sup>34</sup> Consultation at ¶ 142 ("Given their importance to broadcasting, some measures to protect these [licence-exempt] earth stations from interference from new flexible use systems in the 3700-3980 MHz band would be beneficial to the content distribution industry.").



- Observe an out-of-band PFD limit of -124 dBW/m<sup>2</sup>/MHz in the 3700-4200 MHz band at the existing licence-exempt earth stations operating under an interim authorization.
- Observe an in-band PFD limit of -16 dBW/m<sup>2</sup>/MHz in the 3450-3650 MHz band (if 3650-3700 MHz is a WBS-only band) or 3450-3680 MHz (if high-powered flexible use is introduced into the WBS band) in order to prevent receiver blocking.

In addition, if high-powered flexible services will be introduced in the 3650-3680 MHz, passband filters will be needed at the interim-authorized FSS earth stations to ensure that they can continue to operate without receiver blocking prior to the transition deadline. As part of its proposal for financial compensation for accelerated clearing (see Part III above), SES would recommend the FSS operators organize this effort in conjunction with their customers and FSS users in Canada, and that ISED provide a period of 6 months for this to be completed before the commencement of flexible use services in the adjacent 3450-3700 MHz band.

Importantly, if high-powered flexible use services are introduced in the 3450-3700 MHz band, filters will also need to be installed on FSS earth stations to ensure that they can continue to operate in the 3700-4000 MHz band without receiver blocking (see also responses to Q28 and Q36 above). As part of its proposal for financial compensation for accelerated clearing (see Part III above), SES would recommend that the FSS operators organize this effort in conjunction with their customers and FSS users in Canada, and that ISED provide a period of 6 months for filters to be installed before the commencement of flexible use services in the adjacent 3450-3700 MHz band.

In non-satellite-dependent areas, such measures are needed to ensure continuity of FSS service (including important broadcast distribution services) during the transition and would apply until the transition deadline, after which FSS operations in 3700-4000 MHz will have been migrated above 4000 MHz (except at certain satellite gateway locations – see response to Q30 above). The burdens on flexible use licensees should be limited since the measures are temporary and they may have constrained access to the 3650-3700 MHz band anyway before WBS is fully displaced.

If ISED decides that the 3700-4000 MHz band can continue to be used in satellite-dependent areas, however, SES recommends that adjacent band protections be maintained for licensed FSS earth stations in such areas even after the transition deadline (see response to Q28(b) above). Such measures should not present a significant burden to flexible use licensees in 3450-3700 MHz, as they would only be needed when the licensee is operating (whether in a satellite-dependent area or not) near an existing licensed FSS earth station that is in a satellite-dependent area and which is still operating in the 3700-4000 MHz band. Even if, as SES submits, new FSS earth stations are allowed in this band in satellite-dependent areas, the additional burden of protecting these stations should not be too onerous, given the low population density in such areas.

**Q37** *ISED is seeking comments on whether the interim authorization process should also apply to new receive-only FSS earth stations in the 4000-4200 MHz band.*

**SES Response:** SES sees no reason why the interim authorization process should not be available to new receive-only FSS earth stations in the 4000-4200 MHz band. However, applicants should be

free to choose between regular licensing, an interim authorization, or licence-exempt status for new receive-only FSS earth stations in this band. Licensed earth stations in the 4000-4200 MHz band would receive protection from flexible use stations operating in the 3700-3980 MHz by virtue of the limits proposed in response to Questions 7 and 36. This protection would apply to both regular licensing and interim authorizations. As for licence-exempt earth stations, they would not necessarily benefit from the unwanted emissions PFD limit since flexible use operators would not know their locations so could not calculate a PFD level.

**Q38** *ISED is seeking comments on the proposed conditions for interim authorizations for licence-exempt FSS earth stations in 3700-4200 MHz and new receive-only FSS earth stations in the 4000-4200 MHz portion of the band as detailed in annex G.*

**SES Response:** As explained in its response to Q36, SES believes that interim authorizations for licence-exempt FSS earth stations should provide protection from licensees in adjacent bands. On this basis, SES would request that the last sentence in paragraph G5 of annex G be amended by deleting the word “not” after the word “may”.

**Q39** *ISED is seeking comments on the proposed eligibility of licence-exempt stations that could apply for an interim authorization.*

**SES Response:** SES supports ISED’s proposal to allow licence-exempt earth stations in 3700-4200 MHz that are part of an enterprise network (such as those used in broadcast distribution) to obtain interim authorizations.

However, ISED is not proposing to allow receive-only earth stations that are only capable of receiving broadcasting signals and are not part of a distribution undertaking (*i.e.* direct-to-home satellite television receivers) to obtain such an interim authorization. This would appear to be consistent with Section 4(1)(b) of the *Radiocommunication Act*, which specifically exempts such earth stations from licensing.

**Q40** *ISED is seeking comments on its proposal to no longer issue new licences for fixed services to operate fixed point-to-point applications in the 3700-4000 MHz band.*

**SES Response:** No comment.

**Q41** *ISED is seeking comments on whether to allow new licences for fixed services to operate fixed point-to-point applications in the 4000-4200 MHz band.*

**SES Response:** No comment.

**Q42** ISED is seeking comments on the proposal to grandfather existing point-to-point operations in the 3700-4000 MHz band under existing licences for fixed service (as identified in annex A), such that flexible use systems in these two tiers may not claim protection from, nor cause interference to these fixed service stations.

**SES Response:** No comment.

**Q43** ISED is seeking comments on the proposal to rely on technical limits and coordination procedures rather than mandate specific technology solutions (e.g. TDD synchronization between systems) to address interference issues between TDD flexible use systems in the 3650-3980 MHz band.

**SES Response:** No comment.

**Q44** ISED is seeking comments on whether any additional measures should be taken to limit potential interference issues between flexible use systems in the 3650-3980 MHz band. In providing comments, respondents are requested to include supporting rationale and arguments.

**SES Response:** No comment.

**Q45** ISED is seeking comments on whether specific technical measures should be adopted to address potential interference issues between flexible use systems and WBS systems until the displacement deadline.

- a) **For co-channel flexible use and WBS operations in the 3650-3700 MHz band**, what specific measures may be needed to protect WBS? For example, should new flexible use stations be required to coordinate with WBS stations within a specified distance prior to deployment? Alternatively, should a technical parameter such as a power flux density (pfd) trigger for coordination measured at the WBS receive antenna be adopted? Are there other more appropriate measures that ISED should consider? Should multiple measures, such as a combination of distance and pfd trigger for coordination, be adopted? How would these requirements impact the deployment of new flexible use stations?
- b) **For adjacent band flexible use systems**, is there a need to adopt any additional measures, beyond what is currently specified in RSS-192 and SRSP-520, to further address coexistence between these flexible use and WBS systems? If so, what should they be? How many flexible use frequency blocks (or MHz) immediately adjacent to the 3650-3700MHz band could potentially affect WBS systems? How would these requirements impact the deployment of flexible use stations?

**SES Response:** No comment.

## Adjacent band

**Q46** *Until the transition deadline, in all areas for flexible use in the 3650-3700 MHz band: ISED is seeking comments on the proposal that until the transition deadline, those flexible use licensees deploying stations in 3650-3700 MHz within 25 km of a licensed FSS earth station (not including interim FSS authorization) in the 3700-4200 MHz band will be required to coordinate with the operators in these earth stations.*

**SES Response:** Until the transition deadline, SES supports ISED's proposal to provide licensed FSS earth stations in the 3700-4200 MHz band with adjacent band protection from flexible use services in 3650-3700 MHz (see response to Q28(a)). However, for the reasons set out in its response to Q36 above, SES believes that such protection should be extended to licence-exempt FSS earth stations operating under interim authorizations.

Instead of a 25 km coordination distance, SES would prefer adjacent band protection measures at the 3700 MHz band edge that are modelled on the adjacent band measures adopted by the FCC at the 4000 MHz band edge. Specifically, flexible use services operating below 3700 MHz should:

- Maintain a minimum 20 MHz frequency separation from FSS operations above 3700 MHz. If, before the transition deadline, 3650-3700 MHz is a low-power WBS-only band, then this frequency separation will naturally be met for flexible use operations below 3650 MHz. But, if ISED introduces flexible use services above 3650 MHz before the transition deadline, a new 20 MHz guard band at 3680-3700 MHz will have to be established for the duration of the transition period.
- Observe an out-of-band PFD limit of -124 dBW/m<sup>2</sup>/MHz in the 3700-4200 MHz band at any earth station that is licensed (whether regular licence or licence-exempt under interim authorization).
- Observe an in-band PFD limit of -16 dBW/m<sup>2</sup>/MHz in the 3450-3650 MHz band (if 3650-3700 MHz is a low-power WBS-only band) or 3450-3680 MHz (if high-powered flexible use is introduced into the WBS band) in order to prevent receiver blocking at any licensed or interim authorization earth station operating above 3700 MHz.

Importantly, if high-powered flexible use services are introduced in the 3450-3700 MHz band, filters will also need to be installed on FSS earth stations to ensure that they can continue to operate in the 3700-4000 MHz band without receiver blocking (see also responses to Q28 and Q36 above). As part of its proposal for financial compensation for accelerated clearing (see Part III above), SES would recommend that the FSS operators organize this effort in conjunction with their customers and FSS users in Canada, and that ISED provide a period of 6 months for filters to be installed before the commencement of flexible use services in the adjacent 3450-3700 MHz band.

In non-satellite-dependent areas, such measures are needed to ensure continuity of FSS service (including important broadcast distribution services) during the transition and would apply until the transition deadline, after which FSS operations in 3700-4000 MHz will have been migrated above 4000 MHz (except at certain satellite gateway locations – see response to Q30 above). The burdens on flexible use licensees should be limited since the measures are temporary and they may have constrained access to the 3650-3700 MHz band anyway before WBS is fully displaced.

If ISED decides that the 3700-4000 MHz band can continue to be used in satellite-dependent areas, however, SES recommends that adjacent band protections be maintained for licensed FSS earth stations in such areas even after the transition deadline (see response to Q28(b) above). Such measures should not present a significant burden to flexible use licensees in 3450-3700 MHz, as they would only be needed when the licensee is operating (whether in a satellite-dependent area or not) near an existing licensed FSS earth station that is in a satellite-dependent area and which is still operating in the 3700-4000 MHz band. Even if, as SES submits, new FSS earth stations are allowed in this band in satellite-dependent areas, the additional burden of protecting these stations should not be too onerous, given the low population density in such areas.

**Q47** *After the transition deadline, in all areas for flexible use in the 3450 -3650 MHz band: ISED is seeking comments on its proposal that the current SRSP-520 coexistence requirements for flexible use operations in the 3450-3650 MHz band to protect FSS operations in the adjacent band 3700-4200 MHz be removed.*

**SES Response:** As explained in its response to Q46, SES prefers adjacent band measures that are modelled on those adopted by the FCC for the 4000 MHz band edge.

In addition, SES submits that adjacent band measures should continue to apply even after the transition deadline, since ISED is proposing to allow existing FSS operations in 3700-4000 MHz to continue in satellite-dependent areas and at a limited number of gateway sites. The burden on flexible use licensees should be light in the case of ISED's proposal to only protect existing FSS operations. In addition, the burden of protecting future FSS earth stations in this band by the same technical means should not be too onerous, given the low population density in satellite-dependent areas (see responses to Q8, Q30 and Q46 above).

**Q48** *For FSS earth stations licensed in the 4000-4200 MHz band and flexible use in the 3800 MHz band, in all areas: ISED is seeking comments on adjacent band coexistence measures, taking into account the coexistence measures adopted by the EU (i.e. a stringent OOB limit) and the U.S. (i.e. a combination of guard band, a typical OOB limit, pfd limits, and baseline minimum filter specifications for earth station operations) and the current Canadian requirements (i.e. a typical OOB limit and coordination distance):*

- a) *What are the benefits and technical limitations associated with the above coexistence measures?*
- b) *Which set of coexistence measures above (i.e. EU, U.S., Canada) is preferred? If applicable, comments are sought on the values of the limits in relation to the supported measures.*
- c) *Given the proposal in section 9.1 to displace WBS in 3650-3700 MHz and identify 3900-3980 MHz for shared use, are there any additional considerations that may impact the response to a) and b) above?*
- d) *Which portion of the 3800 MHz band should the above measures be applied to in order to protect FSS in the 4000-4200 MHz band (i.e. how many frequency blocks or MHz)?*

**SES Response:** SES supports adjacent band coexistence measures modelled on the ones adopted by the FCC for the protection of FSS earth stations in the 4000-4200 MHz band from flexible use operations in 3700-3980 MHz (see also response to Q7 above). SES believes there are good reasons for Canada to align and harmonize flexible use requirements with the United States in order to ensure ecosystem compatibility and simplify cross-border coordination.

Specifically, the FCC required:

- (a) a 20-MHz guard band at 3980-4000 MHz;<sup>35</sup>
- (b) a PFD limit of -124 dBW/m<sup>2</sup>/MHz applicable to flexible use unwanted emissions falling in the 4000-4200 MHz as measured at the FSS receiver;<sup>36</sup>
- (c) a PFD limit of -16 dBW/m<sup>2</sup>/MHz applicable to flexible use emissions in the entire 3700-3980 MHz band as measured at the FSS receiver to prevent FSS receiver blocking;<sup>37</sup> and
- (d) the implementation of passband filters at satellite earth stations that will reject signals outside of the 4000-4200 MHz FSS band in order to claim interference protection.<sup>38</sup>

Importantly, such measures were implemented based on certain maximum base station and mobile terminal power limits adopted by the FCC, and after a thorough and rigorous analysis of FSS interference protection requirements and FSS receiver and filter performance.

## Co-channel

**Q49** *ISED is seeking comments on what technical requirements should be imposed to ensure co-channel protection of FSS earth stations from flexible use systems, in the relevant scenarios and timeline as stated in sections 9.5 and 9.6. For example, could the pfd limit of -124 dBW/m<sup>2</sup>/MHz measured at the earth station antenna proposed by FCC above be used to protect co-channel FSS earth station? Alternatively, should other measures be adopted, such as a separation distance as described in section 7.3? Or should a combination of measures be adopted? If applicable, what are the specific values that should be adopted?*

**SES Response:** FSS earth stations will require co-channel protection from flexible use services in 3700-4000 MHz under the following scenarios: (1) for existing and possibly new FSS operations in satellite-dependent areas after the transition deadline; and (2) for FSS operations at certain satellite gateways after the transition deadline.

In SES's view, the use of the FCC's PFD limit of -124 dBW/m<sup>2</sup>/MHz as the basis for co-channel protection of FSS operations would provide ample protection for FSS earth station receivers assuming that only a few stations would cause such a PFD at the earth station. The

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<sup>35</sup> *Expanding Flexible Use Order* at ¶ 58.

<sup>36</sup> *Id.* at ¶ 360.

<sup>37</sup> *Id.*

<sup>38</sup> *Id.* at ¶ 371 ("In the event of a claim of harmful interference, the earth station operator must demonstrate that they have installed a filter that complies with the mask described above. If they have not installed such a filter or are unable to make such a demonstration, and the 3.7 GHz Service licensee can confirm it meets the blocking PFD, the earth station operator will have to accept the interference.").

- 124 dBW/m<sup>2</sup>/MHz PFD limit was adopted as an adjacent band measure to protect FSS operations in 4000-4200 MHz from the unwanted (out-of-band and spurious) emissions of flexible use operations in 3700-3980 MHz. As a result, the PFD limit does not take into account the potentially higher aggregate interference that would occur in a co-channel scenario involving the co-frequency emissions from multiple flexible use transmitters.

If such a PFD can be calculated reliably and ensured at the earth station, there would be no interference at the receiver, however, this would require a standard method for calculating the PFD (propagation model, terrain effects, other sources of attenuation) and would require that the earth station operator be able to independently verify these calculations. Otherwise, should actual interference occur at the earth station, the operator would not be able to determine which flexible use station, or which combination of stations are responsible for the interference. The FCC adopted a different approach to protect U.S. TT&C earth stations from co-channel interference. It required flexible use licensees within 70 km of a protected TT&C earth station to coordinate operations. This distance was deemed sufficient for such TT&C stations that normally use small bandwidth carriers, employ large antennas with more directionality, and operate at higher elevation angles.

In SES's view, a minimum distance may be simpler as a coordination trigger. A minimum coordination distance will be simpler because it will not require any complicated calculations. Of course, ISED will have to evaluate whether a 70 km coordination distance is appropriate for all potential TT&C FSS earth station locations in Canada, and what distance will be required for protected gateways and earth stations in satellite-dependent areas. TT&C antennas in Canada are likely to operate at lower elevation angles than U.S. TT&C antennas on account of Canada's higher latitudes. It should also be noted that non-TT&C FSS earth stations tend to be smaller than TT&C antennas and are more likely to be pointed near the horizon as they sometimes have to access satellites far away in longitude near the extremes of the visible portion of the GEO arc. These variables warrant further study.

## Earth station technical parameters

**Q50** *ISED is seeking comments on whether the assumptions made by the FCC about earth stations, including baseline minimum filter specifications for earth station operations as stated above, are applicable to Canadian operations. Is there any additional information that ISED should consider in the development of appropriate technical rules to enable coexistence both co-channel and in adjacent bands?*

**SES Response:** The assumptions made by the FCC about FSS earth stations were based on an extensive and detailed record of evidence and submissions from a wide variety of stakeholders, including the FSS operators themselves. The baseline minimum filter specifications, for example, were arrived at “[a]fter a series of refinements and testing of several prototype filters,”<sup>39</sup> which the FCC then used (together with other factors) to derive the PFD limit of -16 dBW/m<sup>2</sup>/MHz applicable to flexible use transmissions in 3700-3980 MHz to protect FSS earth stations in 4000-4200 MHz from receiver blocking.<sup>40</sup> Ensuring the appropriate combination of the in-band PFD limit, the guard band

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<sup>39</sup> *Expanding Flexible Use Order* at ¶ 367.

<sup>40</sup> *Id.* at ¶¶ 370-371.

width, and the adjacent band PFD limits that recognizes their relationship to one another will be critical for a compatible environment of the FSS and flexible use service.

**Q51** *ISED is seeking comments on its proposal to not implement any technical requirements for the coexistence between flexible use operation in the 3650-3980 MHz band and radionavigation operations in the 4200-4400 MHz band, noting the 220 MHz frequency separation between the bands of operation. If this is not sufficient for coexistence, what other measures would be appropriate? In providing comments, respondents are requested to provide technical analysis to substantiate such proposals.*

**SES Response:** No comment.

**Q52** *ISED is seeking comments on the use of an auction as the licensing process for the flexible use spectrum that would be considered as the 3800 MHz band, noting a separate consultation process would be issued, if required, to determine the licensing framework for the range 3900-3980 MHz.*

**SES Response:** No comment.

***In providing comments for the following questions, respondents are requested to include supporting arguments and rationale, taking into consideration of ecosystems for 5G services and the adjacent WBS operations in the 3650-3700 MHz band.***

**Q53** *ISED is seeking general comments on the proposal submitted by Telesat found in annex H, including whether such an approach would be in the best interest of Canadians and more specifically, whether it would result in the faster deployment of 5G services in the affected frequencies; more efficient use of spectrum and what the implications of this repurposing plan would be for other users of the band.*

**SES Response:** As explained in Part V above, SES opposes the Telesat Proposal to the extent that it proposes the clearing of FSS up to 4100 MHz. The clearing of 3700-4000 MHz is already an incredibly challenging proposition in the U.S. and in Canada. SES' guiding principle is to keep our customers un-harmed and to maintain the best grade service. Clearing up to 4100 MHz is impracticable as continuing to provide FSS in just 100 MHz is simply unsustainable in the short or long term. With 200 MHz of remaining spectrum, re-packing existing users into the remaining spectrum remains viable. With just 100 MHz of spectrum, not only does re-packing become impractical, but the business case for future satellites in the C-band (including replacement satellites) becomes extremely difficult to justify.

SES supports the Telesat Proposal to the extent that it postulates a mechanism for FSS operators to receive financial compensation to accelerate the transitioning of existing FSS users in the 3700-4000 MHz band to the 4000-4200 MHz portion of the band and/or to satellite systems in other frequency



bands. However, SES is concerned that the Telesat Proposal is largely silent and unclear as to how its proposed secondary market transaction mechanism would work, especially with respect to the division of proceeds among affected FSS operators other than Telesat. The Telesat Proposal is also unclear on the terms on which mobile carriers would get access to the cleared spectrum.

Given these uncertainties, SES prefers a financial compensation mechanism similar to the one adopted by the FCC. Under that mechanism, both U.S. and non-U.S. FSS operators (including Telesat) will receive compensation from flexible use licensees in proportion to their respective shares of the U.S. market. SES believes that the method proposed by the FCC affords greater certainty and fairness for all affected FSS operators, and possibly for the mobile carriers as well.

However, if ISED were inclined to adopt the approach suggested by Telesat, the proposal would need to be modified at a minimum so that the flexible use licence(s) is/are issued to a consortium of satellite operators (as discussed above), rather than to Telesat alone. A proper accelerated clearing of the 3700-4000 MHz band requires the concerted effort of multiple FSS operators, each orchestrating the move with their own customers, and cannot be left to Telesat alone.

In addition, in the absence of agreement among the consortium members, ISED may also need to direct how the proceeds from the secondary market transaction involving the spectrum would need to be divided among them. In SES's view, any mechanism for financial compensation must be fair between Canadian and non-Canadian satellite operators providing competing FSS in Canada in this band. Canada's commitments under its international agreements require nothing less.

**Q54** *ISED is seeking comments on whether the Telesat proposal meets ISED's policy objectives outlined in section 3, including:*

- a) supporting rural/remote connectivity*
- b) promoting competition in mobile services*
- c) making more mid-band spectrum available to support 5G services*

**SES Response:** See response to Q53 above. In SES's view, the Telesat Proposal is not the best means of advancing ISED's policy objectives.

**Q55** *ISED is seeking comments on what elements from sections 7 to 10 of this consultation would still apply or need to change if ISED were to implement the Telesat proposal, in particular:*

- a) the proposal for maintaining the primary allocation for FSS in the 3700-4200 MHz band*
- b) the proposed implementation of an exemption to transition for satellite-dependent communities and the proposed changes to satellite licenses to apply it*
- c) the proposal for treatment of WBS incumbents*
- d) the proposal to issue interim authorizations for certain existing licence-exempt earth stations in the 3700-4200 MHz band*
- e) technical considerations for coexistence between FSS and flexible use*
- f) technical considerations for coexistence between flexible use and aeronautical radionavigation systems*
- g) the overall impact on existing users in the 3700-4200 MHz band*

**SES Response:** SES does not support the Telesat Proposal's proposed reallocation of the C-band up to 4100 MHz for 5G and other flexible use services for the reasons set out in Q53 above. However, if ISED were inclined to reallocate up to 4100 MHz, then all of the measures designed to preserve FSS earth stations would have to be transposed from 4000 MHz up to the new band edge at 4100 MHz. In such a case, it would be even more critical to allow new earth stations in satellite-dependent areas to be deployed across the entire 3700-4200 MHz band on a protected basis.

**Q56** *If ISED were to implement the Telesat proposal, ISED would need to consider the licensing framework for the 3700-3900 MHz band. Thus, ISED is seeking comments on:*

- a) whether it should, as proposed by Telesat, issue flexible licences in the 3700-3900 MHz band using the same conditions of licence as those contained in annex H of the 3500 MHz Framework, noting that some conditions may need to be adjusted to reflect the differences in the two bands and the decisions resulting from this consultation process*
- b) whether it should issue a single Tier 1 flexible use licence as proposed by Telesat or align with the 3500 MHz band and issue Tier 4 licences*
- c) what deployment conditions should apply to these licences including Telesat's proposal that the deployment requirements would only come into force after the Minister approves a transfer*
- d) any additional conditions of licence that should apply given the nature of the proposal*

**SES Response:** See response to Q53 above.

**Q57** *In its proposal, Telesat indicates that it takes no position on ISED imposing a pro-competitive measure such as a spectrum cap or set-aside on the 3700-3900 MHz licences. ISED would review any request for transfer in accordance with provisions related to commercial mobile spectrum through section 5.6 of CPC-2-1-23, Licensing Procedure f or Spectrum Licences for Terrestrial Services. However, ISED would also consider the competitive implications on the 3500 MHz and 3800 MHz bands and consider pro-competitive measures in accordance with the Framework for Spectrum Auctions in Canada . As such, ISED is seeking comments on:*

- a) the need for a pro-competitive measure (e.g. spectrum cap or set-aside)*
- b) the type of competitive measure that should be applied*
- c) the amount of spectrum that should be considered under any such competitive measure*

**SES Response:** See response to Q53 above. SES otherwise take no position on these matters.

**Q58** *ISED is seeking comments on Telesat's proposals for the transition of FSS earth stations and whether any additional measures are required to ensure a smooth transition.*

**SES Response:** See response to Q53 above. See also response to Q23 above, as well as SES's proposal for accelerated clearance above.



**Q59** Telesat's proposal includes ISED allocating an additional 80 MHz for flexible use in the 4000-4100 MHz band. ISED is seeking comments on the feasibility of making this extra spectrum available, specifically:

a) whether there would be standardized 5G equipment available for this 80 MHz, given that it does not align with the U.S. band plan

b) whether there would be FSS filters available, given the reduced amount of FSS spectrum and that it would not align with the U.S. band plan

c) whether there would be enough capacity to continue FSS services in Canada with the proposal to reduce the amount of FSS spectrum to 100 MHz

d) to what degree would the requirement to protect U.S. FSS earth stations in the border areas have an impact on the ability to deploy flexible use stations near the border and to what degree would this impact the value of this spectrum

**SES Response:** See response to Q53 above. In response to the issues raised in Q59:

(a) SES takes no position on Q59(a).

(b) SES notes there would be likely reduced economies of scale for FSS filters, because different filters will be required in Canada than in the U.S., Europe or other parts of the world.

(c) SES is concerned that 100 MHz of spectrum in C-band will not be sufficient capacity to sustain FSS services in Canada in the short or long term, as explained in its response to Q53 above.

(d) SES believes that the Telesat Proposal would create an unnecessary mis-alignment of spectrum allocations with the United States, but otherwise expresses no view on the issues raised by Q59(d).

\* \* \* \* \*

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Yours Sincerely,

/s/ Christophe De Hauwer

Christophe De Hauwer  
Chief Strategy & Development Officer  
SES S.A.